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Infrastructure, environment, facilities

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Mitch Cron
USEPA Region III
Hazardous Site Cleanup Division (3HS22)
1650 Arch Street
Philadelphia, PA 19103

ENVIRONMENT

Subject:
Revised Vapor Intrusion Investigation and Pilot Study Work Plan
Bally Groundwater Contamination Superfund Site
Former Bally Engineered Structures Facility, Bally, Pennsylvania

Date:
June 27, 2007

Contact:
Frank C. Natitus

Phone:
267.685.1800

Email:
Frank.natitus@arcaids-us.com

Our ref:
NP000597.0006.00006

Dear Mr. Cron:

On behalf of Sunbeam Products, Inc. (Sunbeam), ARCADIS U.S., Inc. (ARCADIS) has prepared this Work Plan for a supplemental soil gas investigation and a Sub-Slab Depressurization (SSD) Pilot Study (Work Plan) at the former Bally Engineered Structures (BES) facility, Bally, Pennsylvania (**Figure 1**). The Work Plan was prepared in response to the United States Environmental Protection Agency (USEPA) comment letter dated 7 February 2006 and revised in response to additional USEPA comments dated 11 May 2007. In addition, this Work Plan also addresses the comments discussed in a meeting among ARCADIS, Sunbeam, and the USEPA on 5 March 2007.

Vapor intrusion investigation activities and risk evaluations conducted to date have identified an area of concern with respect to vapor intrusion in the former BES facility occupied by Impress Industries. This Work Plan has been prepared to further refine the understanding of the extent of vapor intrusion in this area and to evaluate the feasibility of SSD as a potential remedy.

Project Scope and Objective

There are two main objectives of the proposed investigation and pilot study. The first objective of the proposed investigation is to further refine the understanding of the extent of vapor intrusion of site-related Constituents of Potential Concern (COPCs) in the Impress Industries portion of the former BES facility identified on **Figure 2**. The second objective is to collect the data necessary as part of the pilot study to evaluate the effectiveness of SSD. The results of supplemental investigation and pilot study will be used to evaluate the feasibility of SSD as a remedial alternative to mitigate vapor intrusion in the Impress Industries area.

Background

The former BES facility is located on the southwestern edge of the Borough of Bally, Berks County, Pennsylvania (**Figure 1**). The following subsections describe historical site investigations and present a description of the site as it currently exists. The site was formerly a manufacturing facility for the production of insulated freezer cases. Historic operations included the use of chlorinated compounds to clean and degrease molds, nozzles and small parts used in the manufacturing process. **Figure 2** depicts the facility layout.

Impress Industries occupies a large warehouse (~115,000 square feet) portion of the facility. It is currently used for warehousing and/or storage. It was constructed in stages from approximately 1949-1973. The southwest portion of this area was formerly used as a lagoon/surface water impoundment.

Vapor Intrusion Investigation History

In 2003, the USEPA requested further site characterization activities with respect to the risks posed by the potential for vapor intrusion. Provided below are a summary of reports related to the subsequent investigation activities:

- October 2003 - Sunbeam submitted a Work Plan to the USEPA detailing a plan to conduct subslab vapor sampling at the facility.
- May 2004 – Sunbeam submitted the results of the investigation proposed in the October Work Plan.
- March 2005 - Sunbeam submitted a Work Plan for additional investigation at the facility.
- June 2005 – Sunbeam submitted the results of the investigation proposed in the March Work Plan.
- January 2006 - Sunbeam submitted a supplemental Work Plan to complete additional investigation at the facility.
- December 2006 – Sunbeam submitted the results of the investigation proposed in the January Work Plan.

- February 2007 – USEPA completes Trace Atmospheric Gas Analyzer (TAGA) investigation at Impress Industries and L&Z Public Storage (a.k.a. Luciana & Sons)

Summary of Impress Industrial Vapor Intrusion Investigation Results

A total of six subslab and four indoor air samples have been collected in this area. The highest subslab TCE concentration (210,000 ug/m3) was observed in the southwest portion of the area which corresponds with the suspected location of a former lagoon/surface water impoundment. TCE concentrations detected in indoor air samples in early 2006 range from 11 to 40 ug/m3. However TCE concentrations detected in August through October 2006 range from 180 to 490 ug/m3. Subsequently, USEPA completed an indoor air investigation in this area using their TAGA unit. The results of the TAGA investigation indicated that the presence of TCE was likely from a subslab source. Although significant attenuation has been observed from the subslab to the indoor air, the indoor air results indicate that additional delineation and pilot testing for SSD is warranted. A summary of the results for the Impress Industries area is provided on **Figure 3** and **Table 1**.

Proposed Sample Location and Rationale

Vapor Intrusion Investigation

In order to delineate potential vapor intrusion in the Impress Industries area, additional subslab vapor samples and indoor air samples will be collected. A total of 16 subslab soil vapor samples will be collected in a grid pattern and two indoor air samples will be collected: one location will be situated near historical sample location SV-4B and one will be situated between historical sample locations SV-1 and SV-9. Note, previously collected subslab vapor samples SV-9 and SV-1 lie within in the grid pattern and will provide the data in these areas.

A shifted grid pattern will be established in the area of SV-4B to support the pilot test. A total of four subslab vapor samples will be collected in the vicinity of the pilot study to refine the extent of COPC concentrations in the subslab vapor.

Proposed sample locations are shown on **Figure 4**. Note, indoor air samples will be collected prior to subslab samples to avoid cross contamination. Indoor air and subslab vapor sampling will follow the standard operating procedures (SOPs) previously approved by the USEPA.

Pilot Study Implementation

Concurrent with delineation in the southwest portion of the Impress Industries area, a pilot test will be conducted in order to determine the effectiveness of subslab depressurization for mitigation of COPC vapor intrusion from the subsurface to indoor air. The pilot study will be implemented by installing a simple SSD system consisting of a simple pipe through the floor, venting the subsurface, and measuring the vacuum influence at 5 ft (A), 10 ft (B), and 30 ft (C) from the SSD point. Additionally, the vacuum influence at a point (D) between the SSD point and the edge of the building slab will be measured. The proposed SSD point and associated vacuum monitoring points are shown on **Figure 4**. Implementation of the pilot study will follow the SOP provided in **Attachment 1**.

Construction of the system, shown in **Figure 5**, will require the following:

- Coring through the floor slab;
- Installing a 4" diameter pipe into the core hole and sealing it in place;
- Attaching a blower with vacuum gauge, temperature gauge, and flow meter to the inserted pipe; and,
- Actively venting the subsurface using the blower while exhausting to the outside air.

While venting the subsurface, vacuum influence will be measured from locations A, B, C, and D, described in the delineation section, to monitor the effective radius of influence of the venting system and determine design parameters (flow rate, radial influence, and vacuum) required for a full scale design should the pilot test be successful. A schematic of the typical monitoring point construction for Points A, B, C, and D is shown in **Figure 5**. Vacuum measurements from each of these monitoring locations will be collected every ten minutes for the first hour and then hourly until the readings stabilize (field determined). Vacuum measurements will be performed using appropriate range vacuum gauges. The maximum period of monitoring will not exceed 8 hours. A sample vacuum response monitoring form is included as **Attachment 2**. Additionally, the air flow rate of the blower will be varied to evaluate the change in vacuum at the monitoring points in relation to the flow rate. After the steady state flow rate has been established, a minimum of two additional flow rates will be implemented to evaluate the affects of different flow rates/vacuums on the VMP's.

The exhaust discharge point will be monitored with a photoionization detector (PID) during the pilot test. PID measurements will be collected at the same frequency as the vacuum measurements. Additionally, a vapor sample will be collected from the exhaust discharge point prior to the completion of the pilot test. The vapor sample will be collected using a Tedlar bag and will be analyzed for the site-related COPCs listed below.

Quality Assurance Project Plan

Subslab vapor and indoor air samples will be collected in accordance with the previously approved subslab and indoor air sampling SOPs. QA/QC procedures will follow the procedures set forth in the approved Work Plan dated March 2005. The QA/QC section of the March 2005 Work Plan addresses sample QA/QC procedures, including the collection of QC field samples, sample handling, and maximum holding times.

Consistent with previous investigations, the indoor air and subslab vapor samples collected from the facility will be submitted to Air Toxics Laboratory in Folsom California, for gas chromatography/mass spectroscopy (GC/MS) analysis by modified TO-15 for the following compounds:

Chemical	CAS No.	Low-Level (ppbv)	SIM (ppbv)
Vinyl Chloride	75-01-4	0.1	0.01
1,1-Dichloroethane	75-34-3	0.1	0.02
1,1-Dichloroethylene	75-35-4	0.1	0.01
Cis-1,2,-Dichloroethylene	156-59-2	0.1	0.02
1,1,1-Trichloroethane	71-55-6	0.1	0.02
Trichloroethylene	79-01-6	0.1	0.02

[a] Reporting Limits for Air Toxics Laboratory located in Folsom, California.

Subslab vapor samples will be analyzed by the low-level TO-15 method and indoor air samples will be analyzed by the SIM TO-15 method. All results will be reported to the Reporting Limit specified above. Note that increased reporting limits may be result from peak interference, sample volume or other factors. Concentrations reported in parts per billion by volume will be converted to micrograms per cubic meter using the following equation:

$$ug/m^3 = ppbv \times molecular\ weight\ (grams) \div 24.45$$

where 24.45 = molar volume of air in liters a normal temperature and pressure conditions (i.e., 25°C and 760 torr).

Data Evaluation and Reporting

Data gathered during this supplemental investigation and pilot data will be evaluated as follows:

1) Indoor air sample results will be used to refine the understanding of potential risk associated with continued occupation of the area;

2) Additional subslab sample results will be used to define the area beneath the slab requiring depressurization to mitigate the potential for vapor intrusion; and

3) Pilot study results (vacuum measurements and subslab vapor data from the refined grid area) will be used to aid in the design of the proposed SSD system for the Impress Industries area.

A summary letter presenting the results of the investigation, pilot study, and data evaluation including recommendations for a subslab depressurization system will be submitted to the USEPA following receipt of the analytical results from the laboratory.

Response to USEPA Comment Letter dated February 7, 2007

The USEPA provided comments to Sunbeam, on February 7, 2007, regarding the Bally Groundwater Contamination Superfund Site Facility Vapor Intrusion Evaluation Summary. Responses to the numbered comments presented in the 7 February 2006 USEPA letter are provided below. Each response references the associated USEPA comment number, and the USEPA comments have been provided in italics:

Comment #1 – Page 1, Section 1.1, 1st paragraph states, "The Supplemental facility investigation was aimed at further evaluation of the former BES facility to identify any possible human health risks associated with potential vapor intrusion of Site-related Constituents of Potential Concern (COPCs) present in ground water beneath the buildings." The sentence states that ground water is expected to be the source of volatile organic compound (VOC) vapors identified in the subslab beneath the former BES facility and indoor air. Is it possible that contaminated soil present in source areas at the facility may also be responsible for the creation of VOC vapors at the Site?

Response #1 – As discussed during the March 2007 meeting, the purpose of evaluating vapor intrusion at the facility has been to determine whether

concentrations of site COPCs present in soil and groundwater have the potential to impact indoor air and therefore pose any possible human health risks associated with potential vapor intrusion to the occupants of the building.

Comment #2 – Page 5, Section 2.2.4. If source areas have not been identified in the northwest warehouse building, to what are subslab VOC vapors attributable?

Response #2 – See Response #1 above.

Comment #3 – Page 7, Section 3.2. Please include the results of the Site-specific attenuation factor study using radon as a tracer gas. Also, EPA Region III understands that the use of radon as a tracer gas for VOC vapors, and the associated establishment of Site-specific attenuation factors was being evaluated nationally by Arcadis in cooperation with other regions of EPA. What was the outcome of that evaluation?

Response #3 – Radon data was collected while completing the 2006 facility vapor intrusion study. However, the data generated was not useful due to mechanical problems with the USEPA equipment. The USEPA has gathered a great deal of data evaluating radon vapor intrusion as it relates to TCE and other chemical vapor intrusion and is in the process of evaluating the data. This evaluation has not been released yet.

Comment #4 – Page 13, Section 4.3.2.1, and Page 14, Section 4.3.2.2, and Page 20, Section 5.3. Arcadis concludes that elevated trichloroethylene (TCE) concentrations present in indoor air in the Impress Industries tenant space are likely attributable to an adjacent on-Site tenant, Luciano and Sons, a tub/sink manufacturer who began operations at the facility during the summer 2006. Although documentation has not been received by EPA to present, EPA understands that Arcadis has evaluated the products used by Luciano and Sons, and has not identified a TCE-containing product. In addition, to address this concern, the EPA Environmental Response Team (ERT) from Edison, NJ was requested by EPA Region III to visit the Site with the Trace Atmospheric Gas Analyzer (TAGA) bus. The results of their evaluation will be provided to you upon receipt. Based on EPA Region III's observations of the TAGA evaluation, the following conclusions were reached: 1) TCE containing products were not identified within the Luciano and Sons tenant space, 2) TCE concentrations present in indoor air in Impress Industries (the warehousing tenant space adjacent to Luciano and Sons) were higher than inside the Luciano and Sons tenant space. Based on these observations, Arcadis's conclusion that the Luciano and Sons tenant space is the source of the TCE vapors

identified in indoor air at the Impress Industries tenant space does not seem probable.

Risk assessment calculations were not included in the Arcadis report for the TCE concentrations identified in indoor air at the Impress Industries or Luciano and Sons tenant spaces. However, EPA has performed a risk evaluation using the information provided in the Arcadis report for each of these tenant spaces. The results of EPA's risk evaluation indicate that for the Impress Industries tenant space, carcinogenic risk and non-carcinogenic risks are of concern, and for the Luciano and Sons tenant space, carcinogenic risks are of potential concern.

Based on this information, EPA would like to meet with you as soon as possible to discuss what next steps are necessary to address this concern.

Response #4 – This Work Plan addresses the need for additional evaluation of vapor intrusion in the Impress Industries area as well as future remedial options for mitigating the vapor intrusion concern in this area.

Comment #5 - Page 14, 2nd paragraph. Cis-1,1dichloroethene should be cis-1,2-dichloroethene.

Response #5 – Sunbeam agrees with comment #5.

Comment #6 - Table 2. On Table 2, the 1,1-dichloroethane PADEP screening number should be 50, not 510.

Response #6 – Sunbeam agrees with comment #6.

Reporting and Schedule

Following USEPA approval of this Work Plan and after access is obtained from the site owner, assessment and pilot testing at the facility will commence. Specific activities required to complete the assessment include:

- Site owner approval of access and sampling locations;
- Utility clearance, sample collection, and sample analysis;
- Pilot study installation and completion; and
- Data evaluation and validation.

Results of the investigation, pilot study, and data evaluation including recommendations for a SSD system will be provided to the USEPA approximately six weeks after receipt of the analytical data from the laboratory.

Sincerely,

ARCADIS U.S., Inc.

Christopher T. Sharpe
Project Scientist

Frank C. Natitus, P.E.
Project Manager

Copies:
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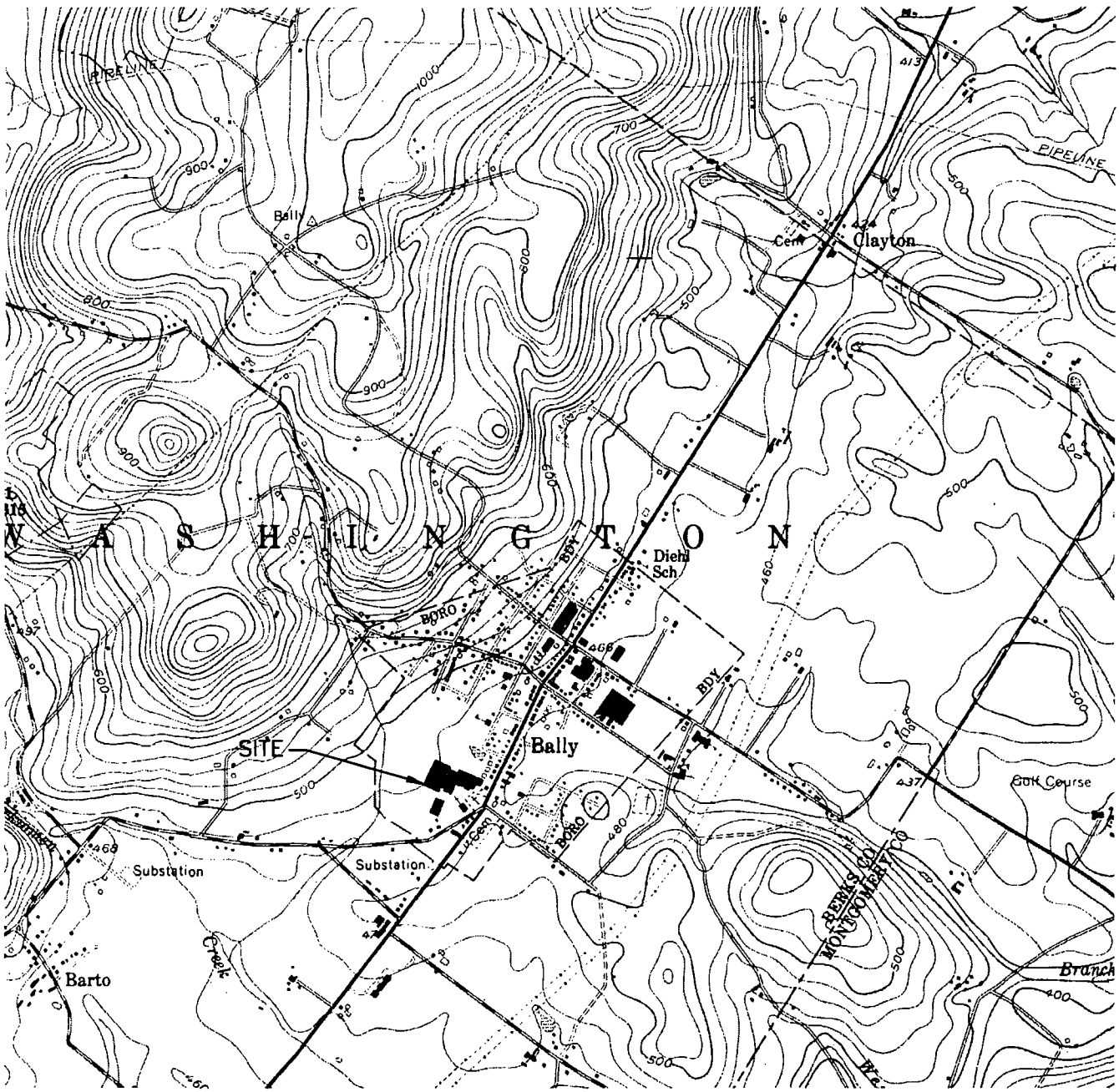
L. Borland
C.A. Gahagan
D. Wisbeck
M. Bedard
W. May

Table 1. Summary of Subslab Soil Vapor and Indoor Air Results
Former BES Facility Bally, Pennsylvania

Location	Sample ID	Sample Date	Medium	Trichloroethene	1,1,-Dichloroethene	1,1-Dichloroethane	cis-1,2-Dichloroethene	1,1,1-Trichloroethane	Vinyl chloride
Screening Levels	USEPA Region 3 Ambient Air RBC Residential			0.016	220	510	37	1000	0.072
	PADEP Indoor Air MSC_{IAQ} Nonresidential			48	580	510	100	6,100	9.5
Area 1: Impress Industries	SV-1	4/7/2004	SV	130	500	1.1	0.89	260	<0.23
	SV-4	4/7/2004	SV	6,100	<22	<70	<22	<67	<14
	TG-1	3/23/2005	SV	17,000	34 J	<35	<35	<48	<22
	SV-4B	2/4/2006	SV	210,000	<590	<600	<590	<810	<380
	IAQ-1	2/4/2006	IA	.40	3.6	<0.13	<0.13	5.4	<0.041
	SV-9	2/28/2006	SV	11	<0.55	<0.56	<0.55	0.78	<0.36
	SS-A-1	8/30/2006	SV	14,000	<34	<35	49	69	<22
	SS-A-1 (dup)	8/30/2006	SV	9,300	<26	<27	29	54	<17
	IA-A-1	8/28/2006	IA	180	62	<0.18	0.18	100	<0.056
	IA-A-1-101206	10/12/2006	IA	280	43	<0.65	<0.64	44	<0.41
	IA-A-3-101206	10/12/2006	IA	490	150	<1.2	<1.2	170	<0.75
Ambient Air Samples	Upwind	2/24/2006	AA	<0.16	<0.06	<0.12	<0.12	<0.16	<0.039
	Downwind	2/24/2006	AA	<0.17	<0.064	<0.13	<0.13	<0.18	<0.041
	AA-East	8/28/2006	AA	0.27	0.12	<0.13	<0.13	0.33	<0.042
	AA-West	8/28/2006	AA	0.19	0.075	<0.13	<0.13	0.27	<0.041

Notes
All results are presented in ug/m^3
J - Results are estimated.
SV - Subslab soil vapor
IA - Indoor air
AA - Ambient air
NA - Not available



SOURCE: USGS 7.5 MIN. TOPOGRAPHICAL QUADRANGLES EAST GREENVILLE, PENNSYLVANIA 1967, PHOTOREVISED 1985.

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Project Director	M. WOLFERT
Task Manager	C. SHARPE
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SUNBEAM PRODUCTS INC.
FORMER BALLY ENGINEERED STRUCTURES

SITE LOCATION MAP

BALLY, PA

Project Number	NP000597.002
Drawing Date	6 FEBRUARY, 2006
Figure	1

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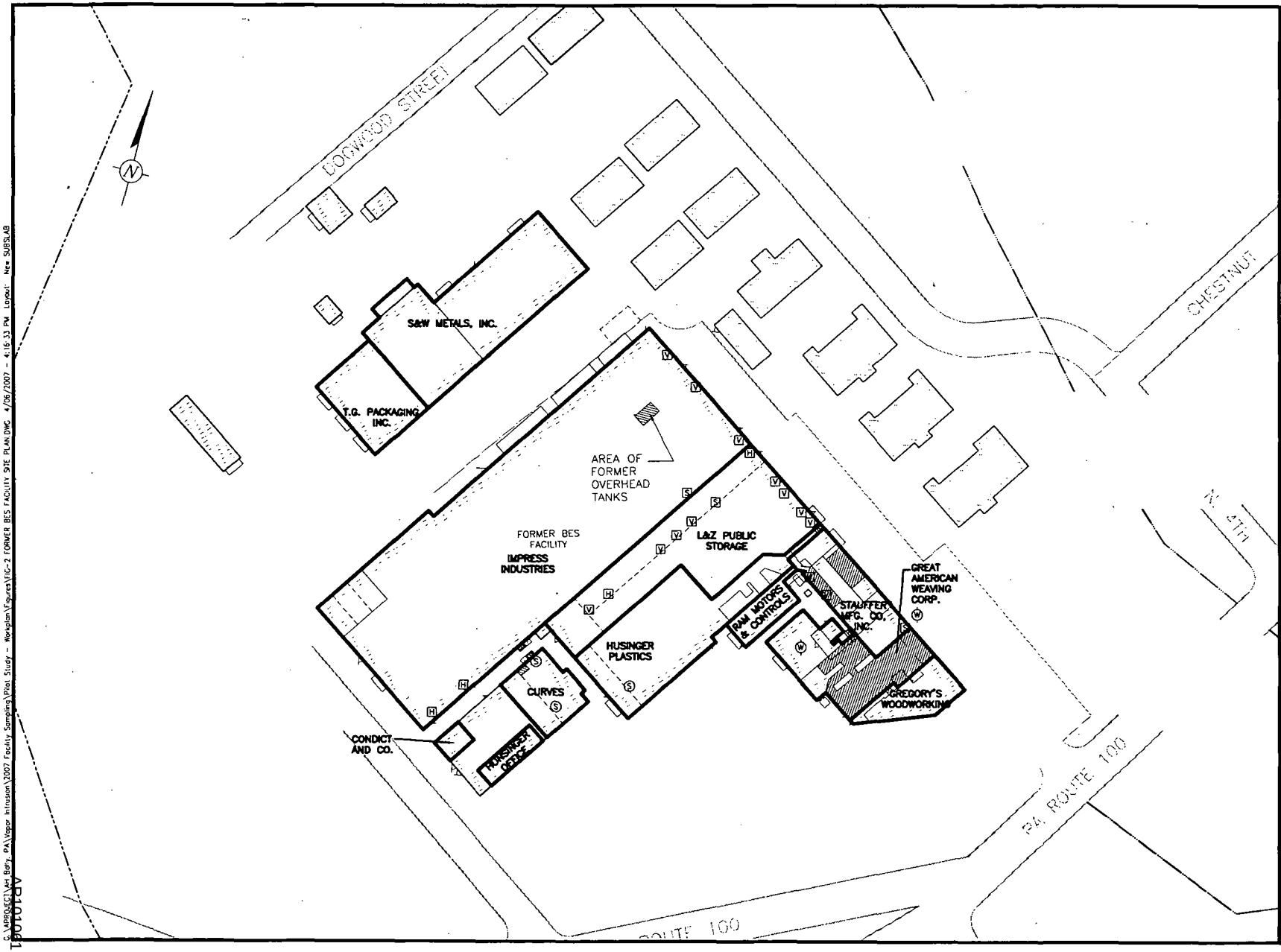

LEGEND:

- STREAM
- V — VENT OR VENT FAN
- H — OVERHEAD HEATING UNIT
- S — SPRINKLER LINE THROUGH FLOOR
- W — WATER LINE
- WOOD FLOOR UNDERLAIN BY CONCRETE
- STORM DRAIN
- S — SUMP

NO.	DATE	REVISION DESCRIPTION	BY / CKD

SUNBEAM PRODUCTS, INC.
BALLY GROUNDWATER SITE

BALLY BOROUGH
BERKS COUNTY, PENNSYLVANIA

FORMER BES FACILITY
SITE PLAN

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0 120
SCALE: 1"=120'

PROJECT MANAGER	DEPARTMENT MANAGER
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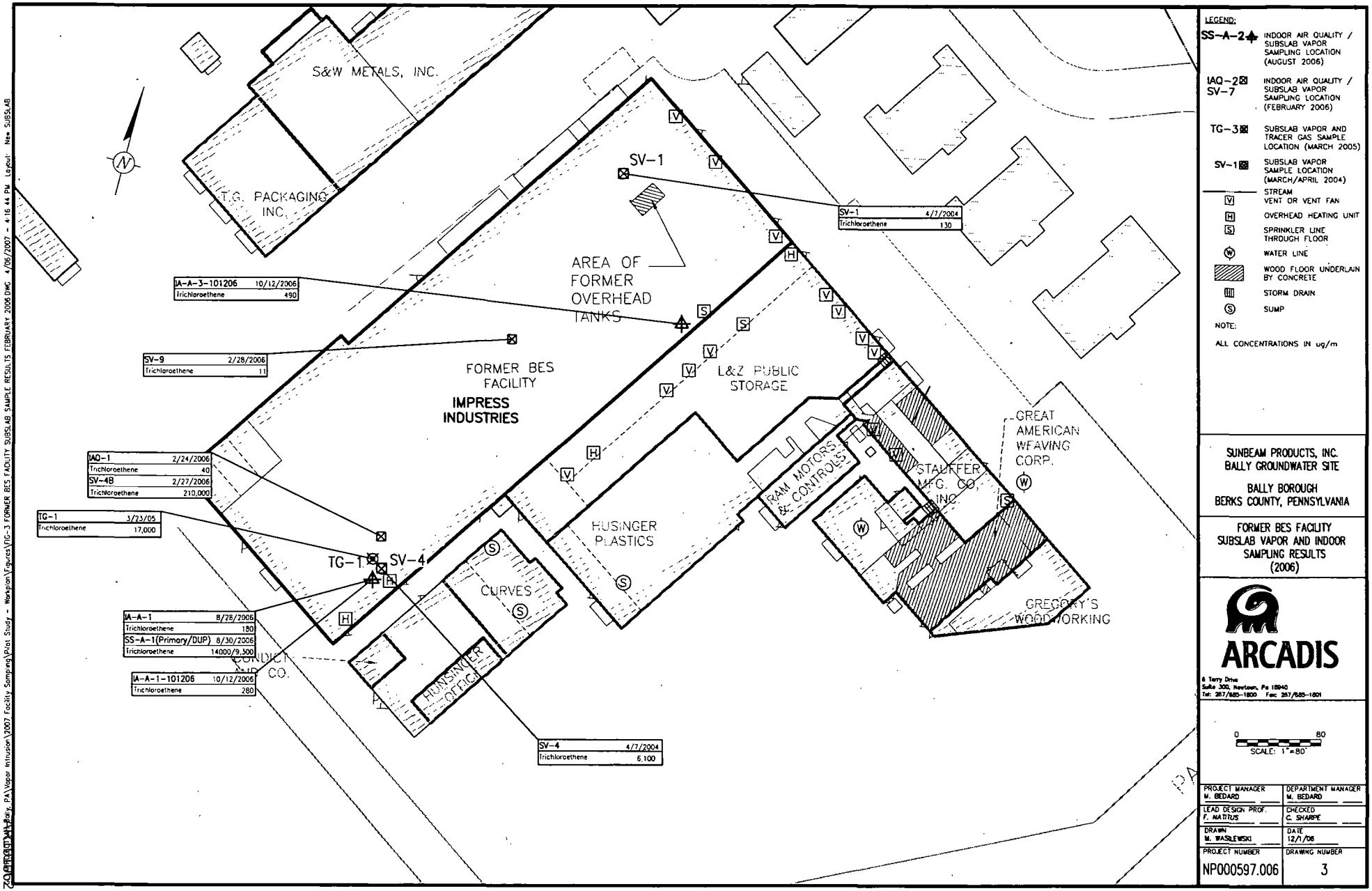
DRAWN	DATE
M. WASILEWSKI	3/21/08
PROJECT NUMBER	DRAWING NUMBER
NP000597.006	2

G:\NPROJECTS\Bally, PA\Vapor Intrusion\2007 Facility Sampling\Pilot Study - Workplan Figures\FIG-2 FORMER BES FACILITY SITE PLAN.DWG 4/06/2007 - 4:16:33 PM Layout: New SUBSLAB



LEGEND:

- SS-A-2 — INDOOR AIR QUALITY / SUBSLAB VAPOR SAMPLING LOCATION (AUGUST 2006)
- IAQ-2 / SV-7 — INDOOR AIR QUALITY / SUBSLAB VAPOR SAMPLING LOCATION (FEBRUARY 2006)
- TG-3 — SUBSLAB VAPOR AND TRACER GAS SAMPLE LOCATION (MARCH 2005)
- SV-1 — SUBSLAB VAPOR SAMPLE LOCATION (MARCH/APRIL 2004)
- STREAM
- V — VENT OR VENT FAN
- H — OVERHEAD HEATING UNIT
- S — SPRINKLER LINE THROUGH FLOOR
- W — WATER LINE
- WOOD FLOOR UNDERLAIN BY CONCRETE
- STORM DRAIN
- S — SUMP

NOTE:

ALL CONCENTRATIONS IN ug/m

SUNBEAM PRODUCTS, INC.
BALLY GROUNDWATER SITE

BALLY BOROUGH
BERKS COUNTY, PENNSYLVANIA

FORMER BES FACILITY
SUBSLAB VAPOR AND INDOOR SAMPLING RESULTS
(2006)

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0 80
SCALE: 1" = 80'

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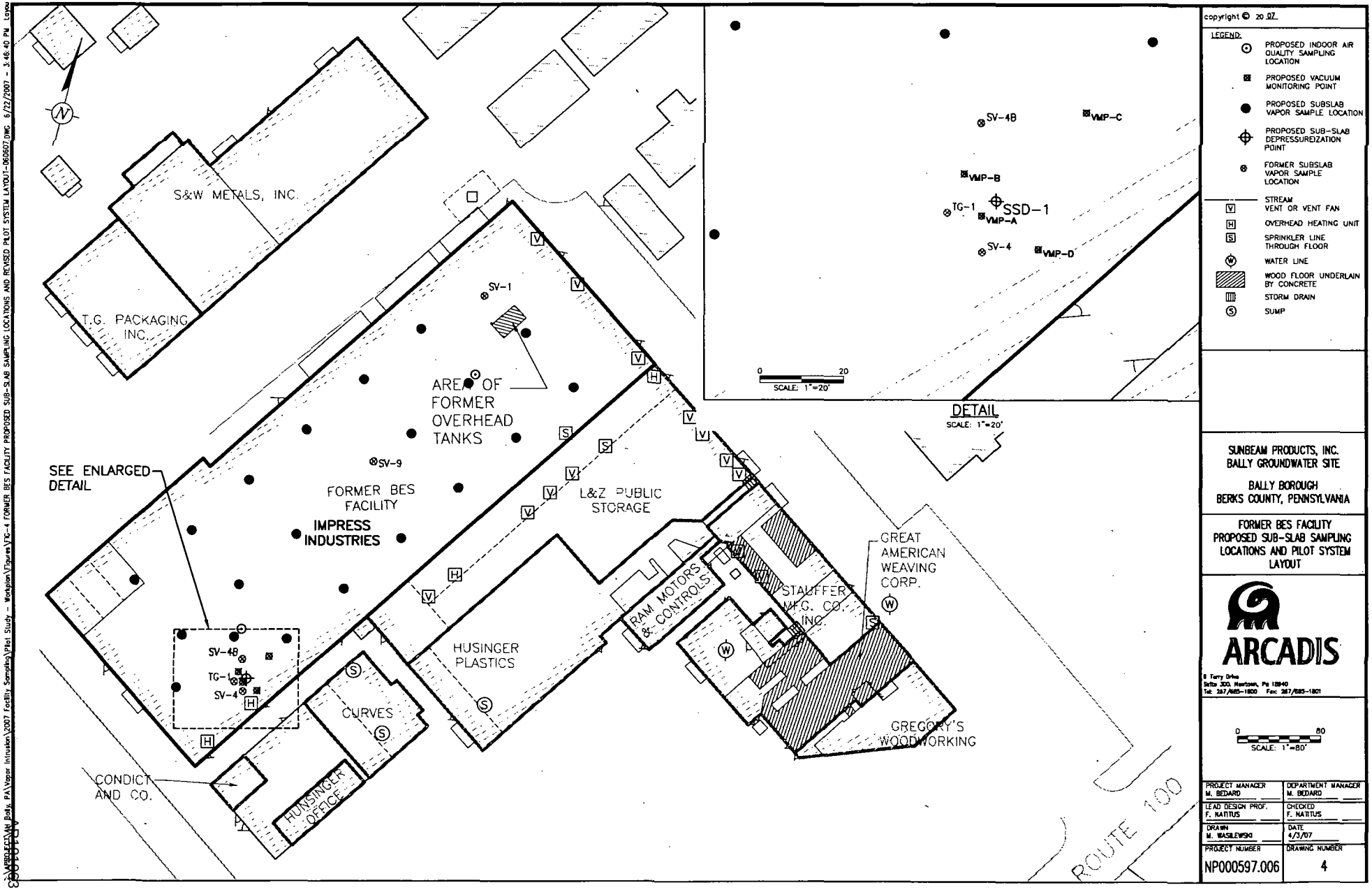
DRAWN	DATE
M. WASILEWSKI	12/1/06
PROJECT NUMBER	DRAWING NUMBER
NP000597.006	3



LEGEND:

- PROPOSED INDOOR AIR QUALITY SAMPLING LOCATION
- PROPOSED VACUUM MONITORING POINT
- PROPOSED SUBSLAB VAPOR SAMPLE LOCATION
- PROPOSED SUB-SLAB DEPRESSUREIZATION POINT
- FORMER SUBSLAB VAPOR SAMPLE LOCATION
- STREAM
- V VENT OR VENT FAN
- H OVERHEAD HEATING UNIT
- S SPRINKLER LINE THROUGH FLOOR
- W WATER LINE
- WOOD FLOOR UNDERLAIN BY CONCRETE
- STORM DRAIN
- S SUMP

SUNBEAM PRODUCTS, INC.
BALLY GROUNDWATER SITE

BALLY BOROUGH
BERKS COUNTY, PENNSYLVANIA

FORMER BES FACILITY
PROPOSED SUB-SLAB SAMPLING LOCATIONS AND PILOT SYSTEM LAYOUT

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0 80
SCALE: 1"=80'

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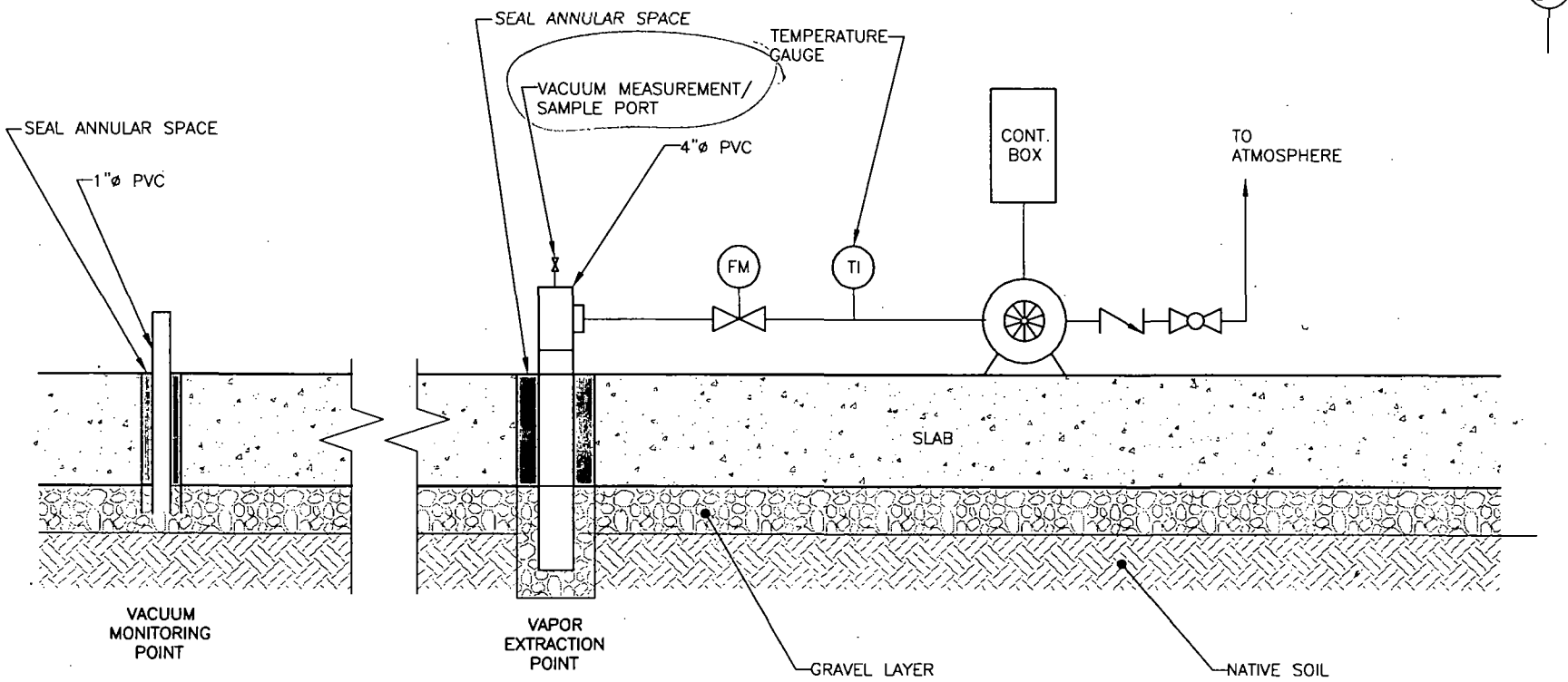
DRAWN	DATE
M. WASILEWSKI	4/3/07
PROJECT NUMBER	DRAWING NUMBER
NP000597.006	4



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NOT TO SCALE

USE MAGNEHELICS FOR MONITORING VACUUM INFLUENCE AND MONITORING POINTS – 0 TO 1" WC, 0 TO 5" WC, 0 TO 20" WC

Area Manager	R. GAN
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Task Manager	P. SHAH
Technical Review	P. SHAH

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SUNBEAM PRODUCTS INC.
BALLY WATER RESOURCES INVESTIGATION

PILOT STUDY SUB-SLAB DEPRESSURIZATION SYSTEM

BALLY, PA

Project Number	NP000597.006
Drawing Date	8 JUNE, 2007
Figure	5

Path\Name: C:\PROJECT\WI Bally, PA\Vapor Intrusion\2007 Facility Sampling\2007.0627 revised pilot study workplan\Figures\FIG-5 PILOT STUDY REVISED SUB-SLAB DEPRESSURIZATION SYSTEM-060807.dwg
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Acad Version: 16.1s (LMS Tech) User Name: Slattery, Carol

ARCADIS

STANDARD OPERATING PROCEDURE NO. 6

SubSlab Depressurization Pilot Test

Scope: This procedure describes the methodology to be used for subslab depressurization (SSD) pilot testing.

Purpose: The purpose of this procedure is to ensure good quality control in field operations, uniformity between different field personnel, and to allow traceability of possible cause of error in analytical results.

Equipment: Core Drill Machine (by others); SSD system; tedlar bags; peristaltic pump; ¼-inch ID Masterflex tubing; non-shrink grout; vacuum gauges; PID; 6-L Summa canister; regulator; barometer.

Procedure:

Vacuum Monitoring Point Installation

1. Prior to vacuum monitoring point (VMP) installation, identify and mark utilities coming into the building from the outside (e.g., gas, water, sewer, refrigerant, and electrical line) and utilities beneath (inside) the building.

2. Core an approximately 3-inch diameter hole for each of the VMP's.

3. Remove the core and approximately 3-inches of subslab soil, and place approximately 2-inches of gravel in the base of the hole.

4. Install a 1-inch diameter schedule 40 PVC pipe at each of the VMPs. Place the base of the pipe directly onto the gravel.

5. Place additional gravel in the annular space around the VMP pipe to raise the gravel level to approximately even with base of concrete.

6. Seal annular space around piping with non-shrink grout in a thickness equivalent to the thickness of the concrete slab. Note that grout should be mixed as a thick paste, as a liquid thin mixture will run into the gravel material and seal off the pore space around the point.

7. Complete VMP apparatus with a 1-inch slip to thread (female NPT) coupling, 1-inch male NPT end-cap, ¼-inch threaded (male NPT) to hose barb stop cock, and polyethylene (PET) tubing.

Solvent weld the coupling onto the 1-inch PVC pipe, and then thread the end-cap into the coupling using Teflon tape to seal. Tap a ¼-inch hole into the end-cap and screw the threaded end of the stopcock into the end-cap. Place the PET tubing on the hose barb. Confirm that stopcock is closed.

Depressurization Point Installation

1. Prior to SSD point installation, identify and mark utilities coming into the building from the outside (e.g., gas, water, sewer, refrigerant, and electrical line) and utilities beneath (inside) the building.

2. Core an approximately 8-inch diameter hole through cement slab for the SSD point.

3. Remove the core and approximately 6-inches of subslab soil, and place approximately 3-inches of gravel in the base of the hole.

4. Install a 4-inch diameter schedule 40 PVC pipe at the SSD point. Place the base of the pipe directly onto the gravel.

5. Place additional gravel in the annular space around the SSD point to raise the gravel level to approximately even with base of the concrete.

6. Seal annular space around piping with non-shrink grout in a thickness equivalent to the thickness of the concrete slab. Note that grout should be mixed as a thick paste, as a liquid thin mixture will run into the gravel material and seal off the pore space around the point.

7. Complete SSD point in accordance with Figure 5 from the Work Plan.

Background Monitoring

Prior to start-up of system, collect a full round of background measurements. The monitoring shall consist of vacuum and PID readings at each of the VMP's, and the sample port on the well head at the SSD point.

1. Record date, weather, and atmospheric pressure on log sheet.

2. Connect Polyethylene tubing to the hose barb on the stop cock, and connect other end of tubing to the vacuum gauge with a range of 0 to 5-inches of water. Make sure that gauge and tubing connections are configured to measure vacuum and not pressure.

3. Open the valve on the stopcock, wait approximately 10 seconds or until reading stabilizes, whichever is longer, and then record the location, vacuum reading, and time on the log sheet. If the vacuum is greater than 5-inches of water, then use an increasingly larger vacuum gauge until a gauge is found with the proper range.

4. Following completion of vacuum measurement, purge vapor probe by filling two 1-liter Tedlar bags or routing purge air to the exterior of the building with tubing. A purge volume of 2 liters was chosen based on the assumption of a 2-inch sampling interval and an affected sample diameter of 0.61 m (2 ft.). Purge rate should be approximately 200 cubic centimeters per minute (i.e., 5 minutes per Tedlar bag).

5. Record the purge date, location, volume purged, and time on the log sheet.

6. Remove the purged air from the Tedlar bag and collect a 1-liter volume sample. Leave the tubing connected to the Tedlar bag and disconnect the opposite end from the hose barb. Using a PID, collect a reading of the sample in the Tedlar bag.

7. Record the location, PID reading, and time on the log sheet.

System Startup and Monitoring

1. Prior to the start-up of the system, confirm that the isolation valves for the SSD point and the make-up air are fully open. Start the blower.

2. Slowly close the make-up valve until the flow rate is approximately 40 SCFM or until make-up valve is completely closed. Note in field book final position of make-up valve (e.g. ~25% closed).

3. Begin monitoring by collecting an initial round of vacuum measurements at each of the VMP's and the sample port on the SSD point well head. Follow steps 2 and 3 from the Background Monitoring section above.

4. Collect a sample from the sample port on the SSD point well head and analyze with a PID. Following the procedures outline in steps 4, 5, 6, and 7 from the Background Monitoring section above.

5. Record the air flow rate and temperature of the discharge effluent.

6. Repeat step 3, 4, and 5 above every 10 minutes for the first hour and every 1 hour thereafter until the end of the test.

Effluent Air Sampling

Prior to completion of the pilot test, an air sample will be collected from the sample port located on the well head of the SSD point utilizing the following procedure. The system shall remain running during this test.

1. Purge vapor probe by filling a single 1-literTedlar bag or routing purge air to the exterior of the building with tubing. A purge volume of 1 liter was chosen as sufficient to purge the headspace below the cap on the well head tee. Purge rate should be approximately 200 cubic centimeters per minute (i.e., 5 minutes per Tedlar bag).

2. Record the purge date, location, volume purged, and time on the log sheet.

3. Collect vapor sample in evacuated 100 percent sim-certified 6-liter Summa canister equipped with a regulator to control intake rate. Sampling rate should be approximately 200 cubic centimeters per minute. Check vacuum in canisters prior to sampling. At least 4 liters of air will be collected in the canister for analysis (i.e. 20 minute collection time at 200 cubic centimeters per minute). Following sample collection, check and record final vacuum in canister. Submit canister to a commercial laboratory for analysis. Record sample ID, date, time, and analysis requested on the sample label.

Attachment 2

Vacuum Influence Monitoring

ARCADIS G&M

VACUUM INFLUENCE

Project/No. NP000597.0006.00007 Date _____
Personnel _____ Time _____
Facility _____ Weather _____

DESCRIPTION OF SAMPLE LOCATION:

Subslab Extraction Point

Vacuum at Blower (in H_20) _____
Air Flow Rate (fpm) _____
Temperature ($^oF/^oC$) _____
Start Time _____
End Time _____

Monitoring Point Data

Time	Point A	Point B	Point C	Point D
(mins lapsed)	*(in H_2O)*	*(in H_2O)*	*(in H_2O)*	*(in H_2O)*
10				
20				
30				
40				
50				
60				
120				
180				
240				
300				
360				
420				
480				
540				
600				

Notes: _____